Monitoring Study Group Meeting Minutes

May 19, 2004
Western Mendocino County
Field Tour to Observe and Discuss Watercourse Crossings

The following people attended the MSG meeting: Tharon O'Dell (BOF-chair), Dave Hope (NCRWQCB), Tom Weseloh (CalTrout), Richard Gienger (HWC/SSRC), Peter Ribar (CTM), Margie Lopez Read (SWRCB), Will Stockard (UCCE), Tom Spittler (CGS), Joe Croteau (DFG), Chris Rowney (CDF), Paul Dalka (DFG), John Griffen (CDF-JDSF), Will Arcand (NCRWQCB), Lynn Webb (CDF-JDSF), Jon Hendrix (DFG), Julie Bawcom (CGS), Leslie Markham (CDF), Robert Horvat (CDF-JDSF), Bram Sluis (Bio Engineering Associates), Casey Blanton (Ridge to River), Matthew Reischman (CVRWQCB), Jeanette Pedersen (CDF), Marty Hartzell (CVRWQCB), David Sinclair (public), Jess Derickson (CDF-JDSF), Holly Lundborg (NCRWQCB), Christine Wright-Shacklett (NCRWQCB), Dennis Hall (CDF), Liz Keppeler (USFS-PSW), Dr. Marty Berbach (DFG), Rick Macedo (DFG), Tracie Hughes (DFG), Brad Valentine (DFG), Teri Jo Barber (Ridge to River), Clare Golec (DFG), Stephen Levesque (CTM), Tom Schultz (MRC), Rob Rempel (MRC), and Pete Cafferata (CDF).

Pete Cafferata began the meeting by presenting a brief summary of why the MSG decided to have a field meeting to observe and discuss watercourse crossings. Past monitoring work conducted in California and elsewhere has shown crossings to be a major source of erosion and sediment entry into watercourses. For example, the BOF Hillslope Monitoring Program results from 1996 through 2001 showed that statewide, 45% of crossings evaluated had one or more problems. Crossings are frequent problem sites due to their high risk location and sometimes inadequate design, construction, removal/abandonment, and maintenance. Actual and potential road-related sediment delivery is very high at or near crossings, since these features are built in watercourses. A short list of potential measures to identify and prevent watercourse crossing problems includes: (1) an inventory of high risk crossings and development of a schedule for replacement (part of a Road Management Plan), (2) improved winter and annual maintenance programs, (3) better culvert sizing for wood and sediment passage, as well as 100-year flood flows, (4) improved construction and design of road drainage structures built immediately above crossings, and (5) improved application of crossing abandonment measures through training with experienced individuals.

The main objectives of this field trip were to: (1) look at properly functioning crossings, crossings needing improvement, and abandoned crossings, and (2) provide an open forum for discussion of practices, with suggestions for improvements where appropriate. We thank Mendocino Redwood Company, Campbell Timberland Management, and the staff of Jackson Demonstration State Forest for allowing the MSG onto their timberlands and their help in putting this tour together.

Each of the 10 field sites visited is briefly summarized and photographs of each site follow the text.

Stop 1. Jackson Demonstration State Forest (JDSF)—Sindel Gulch, James Creek watershed, Road 111 (Figure 1). John Griffen stated that this portion of James Creek, a tributary of the North Fork of Big River, was first harvested in the mid-1950's with crawler tractors. Road 111 was built in 1979 for the second harvest entry. A CDF inspection in 1979 noted numerous violations of the Forest Practice Rules (FPRs) associated with the 1979 timber sale. Violations were issued and corrective measures undertaken but significant amounts of erosion occurred related to road and landing construction. Based on recommendations by CGS (formerly CDMG) engineering geologist Mike Huffman, a perforated standpipe was placed on the 36 inch CMP installed for the Class II watercourse to allow water to enter the pipe as sediment in the channel buried the pipe inlet, and a 24 inch CMP was installed much higher in the road prism as an overflow pipe. This configuration worked for approximately 20 years, but eventually material overtopped the inlet of the standpipe and during the winter of 2001/2002 water overtopped the road, resulting in erosion at the outlet. In 2002, a backhoe excavated the sediment basin and exposed the top two-thirds of the standpipe structure. Headcutting occurred in the channel in 2003 and 2004, and by the spring of 2004, the channel had downcut back to the original pipe elevation, flushing large quantities of sediment downstream.

There was considerable discussion about how to improve the existing situation. The lower 36 inch culvert is in need of replacement and a much larger pipe would be required under the current FPRs. It was the consensus of the group that the best solution is to properly abandon the crossing and mid-slope road system. Tom Spittler stressed that an assessment of the hillslope erosion problems present in the basin and survey of existing sediment storage in the channel above the crossing should be completed prior to determining an engineering solution if the crossing is to be reconstructed. Sediment catch basins can be installed but must be adequately maintained indefinitely.

Stop 2A. Jackson Demonstration State Forest (JDSF)—Sindel Gulch, James Creek watershed, Road 110 (Figure 2). The group observed an existing 60 inch CMP lower down on the same Class II drainage as the structure described above. John Griffen stated that this pipe appears to have been installed for a timber sale that took place in the James Creek drainage in the mid-1980's. A piece of large wood at the culvert entrance is currently blocking the lower part of the pipe inlet, causing abundant sediment storage upstream. A considerable amount of water is flowing under the pipe and an old sediment terrace (probably at least 20 years old) indicates that the pipe (or previous pipe) has been overtopped in the past. It was agreed that if the pipe is removed as part of a road abandonment project, the huge load of sediment in the channel will destabilize and move down into fish bearing waters below. Therefore, Tom Spittler and Dave Hope suggested that the best alternative would be to build grade control structures in the channel. Based on future documentation of channel conditions, one way to do may be to install jetty size (2 ton plus) boulders, preventing a quick pulse of sediment from moving downstream. Boulder grade control is far superior to other types of structures such as gabion baskets that degrade and tip over in the channel. Boulder grade control structures would mimic natural processes, leading to a step-pool channel configuration over time. Holly Lundborg stressed that if this pipe was included as part of a THP, it would have to be fixed to reduce a large potential sediment source area.

Stop 2B (Figure 3). Another older 60 inch CMP was observed on Road 110 in a nearby tributary draw. It is likely that this pipe is at least 40 years old and currently little water is flowing through the pipe due to heavy corrosion. John Griffen explained that typically pipes fail first at the lower end, the outer fill is lost, with fill erosion then working upstream towards the pipe inlet, often causing pipes to separate at joints. Clearly this pipe needs to be either replaced or the crossing properly abandoned. The Road Management Plan included in the JDSF Management Plan calls for inventorying all JDSF roads and crossings in a five year period to locate high risk sediment sites, such as those described above.

Stop 3. Jackson Demonstration State Forest (JDSF)—North Fork of James Creek Class II Tributary, Road 110 (Figure 4). We observed a site where two earlier culverts had failed due to abrasion from bedload sediment movement over the pipe bottom. John Griffen stated that the bottom third of the invert circumference of the existing 60 inch CMP was paved with concrete to protect the bottom of the pipe, and the rocked headwall was cemented to reduce inlet erosion potential four years ago. The total cost of installation (pipe, cement slurry, labor and equipment) was $17,500. Rick Macedo cautioned that cement is extremely toxic to aquatic life and must be used very carefully in stream systems. It was also noted that a long inside ditch system delivers large quantities of fine sediment directly into this Class II watercourse. More frequent cross drain structures are needed or road improvement work that would remove the inside ditch, outslope the road, and install rolling dips--hydrologically disconnecting the road network from the channel.

Stop 4. Mendocino Redwood Company (MRC)—North Fork of Big River, Entrance THP 2001 (Figure 5). The group observed two sites where 18 inch culverts were removed from small Class III watercourses and dips with rocked outfalls were installed three years ago. The road was outsloped with dips and inside ditches were removed as part of the THP work. Rob Rempel stated that MRC is attempting to use fewer culverts were possible, reducing maintenance requirements and long-term crossing failure potential. He estimated that these dipped crossings cost only $800 to $1000, but the critical factor for cost is the distance to the rock pit. It is very important to have the rip-rapped outlet extend up to the elevation of the road surface to prevent backcutting. It is also essential to dip the road out so that there is a positive grade on the downhill side of the crossing, preventing water from running down the road surface. In general, one to three loads (10 to 30 cubic yards) of rock are required for these types of outlets. On steeper slopes, a key way is cut with an excavator and rock is placed on the slope with the excavator. These types of crossings, or rocked ford crossings for larger drainages, can be cost effective in the long-term, since annual maintenance is reduced and pipes do not need to be replaced every 25 years. Tom Schultz emphasized that these crossings are more appropriate for seasonal and temporary roads that are not used or generally observed in the winter period.

Stop 5. Mendocino Redwood Company (MRC)—East Branch of the North Fork of Big River, Pits THP 2001 (Figure 6). An abandoned Class II watercourse crossing was observed. Rob Rempel stated that this site had a partially plugged 36 inch CMP and 18 inch backup culvert in place prior to abandonment. The excavator operator and RPF looked carefully for the natural channel bottom when the work was completed in 2001 and determined that they had successfully located the old channel elevation. After three winter periods, very little downcutting or backcutting has taken place. The sides of the excavation were sloped back and mulched with straw. Spoils from the operation were placed just up the old road, compacted, and treated to reduce surface erosion. The excavated channel bottom was not armored with rock since it was determined that the old channel surface had been located. Mr. Rempel estimated that this operation only cost approximately $500-600. Additionally, approximately 1300 feet of road were abandoned above and below this crossing. At the entrance to the main road, very heavy concentrations of wood and slash were applied to keep traffic off the abandoned road.

Stop 6. Campbell Timberland Management (CTM)—Two Log Creek mainline haul road (Figure 7). An 84 inch culvert installed in 1998 on a Class II watercourse was observed. Peter Ribar stated that previously this site had an old Humboldt crossing that was failing. The inlet and outlet are heavily armored with rock. Fill was removed to eliminate the flat grade and allow the road to drop into and pull out of the crossing—removing diversion potential at this site. It was thought that this tributary to Two Log Creek, which flows into Big River, was a restorable Class I watercourse, but the lower end of the culvert was placed about two feet higher than the stream channel, preventing the possibility of fish passage. CTM biologists, however, question the assumption that this small tributary actually has fish habitat due to its steep gradient.

Stop 7. Campbell Timberland Management (CTM)—Two Log Creek mainline haul road (Figure 8). A 60 inch CMP on a Class II watercourse was observed and discussed. Peter Ribar stated that prior to recent work, there was extensive ditchline erosion. Work done about six years ago redirected ditch flow onto a rocked apron which successfully arrested the erosion problem. Extensive sediment and woody debris upslope of the pipe inlet was addressed through the installation of jetty size rip-rap/rock buttressing around the pipe inlet. Additionally, an 84 inch mitered, slotted standpipe was installed over the pipe inlet as a retrofit to increase inlet capacity. Currently the 60 inch CMP inlet area is about half full of sediment and should be cleaned. Stephen Levesque stated that when large pipes are installed under significant fills, consider using a lower gauge metal (lower number = thicker metal). Additionally, aluminizing the pipe at the factory can extent the useful life of the structure by 5 to 10 years.

Stop 8. Campbell Timberland Management (CTM)—Two Log Creek mainline haul road; bridge over Big River (Figure 9). A 110 foot bridge was observed and discussed. Previously, a low water crossing was used in the summer period. Peter Ribar stated that concrete footings are in place and this structure cost over $120,000 to construct. The USGS operates a gaging station immediately downstream from this bridge on Big River and the flow during the field trip was about 28 cfs.

Stop 9. Mendocino Redwood Company (MRC)—Two Log Creek mainline haul road (Figure 10). A 62 foot railcar bridge installed by MRC in 2001 was very briefly observed. It replaced a log stringer ridge over Two Log Creek and log abutments are in place.

Stop 10. Campbell Timberland Management (CTM)—Two Log Creek mainline haul road (Figure 11). A 36 inch CMP on a Class III watercourse with a half-round downspout and rocked armor outfall was observed. This structure is six years old and operating without problems. Stephen Levesque and Peter Ribar discussed compaction standards and pipe installation requirements on CTM-Hawthorne timberlands.

Figure 1. JDSF (stop 1). Old perforated standpipe, overflow CMP and excavated channel in a James Creek tributary.

Figure 2. JDSF (stop 2A). 60 inch CMP with a heavily aggraded channel upstream of the inlet in a James Creek tributary (photo taken by Brad Valentine).

Figure 3. JDSF (stop 2B). Old corroded 60 inch culvert in need of replacement or removal in a James Creek tributary.

Figure 4. JDSF (stop 3). 60 inch CMP in a North Fork James Creek tributary with cemented headwall and cemented pipe bottom to resist abrasion.

Figure 5. MRC (stop 4). Dipped Class III crossing where an 18 inch CMP was removed and a rocked outfall was installed.

Figure 6. MRC (stop 5). Abandoned Class II watercourse crossing showing almost no downcutting after three winter periods.

Figure 7. CTM (stop 6). Class II 84 inch pipe outlet without fish passage.

Figure 8. CTM (stop 7). 60 inch CMP with 84 inch standpipe; heavy boulder rip-rap.

Figure 9. CTM (stop 8). Bridge over Big River and USGS gaging station.

Figure 10. MRC (stop 9). Railcar bridge installed over Two Log Creek.

Figure 11. CTM (stop 10). A 36 inch CMP on a Class III watercourse with a half-round downspout and rocked armor outfall.